Conversion Technologies Life Cycle and Market Assessment

CONSOLIDATED FOCUS GROUP COMMENTS AND RESPONSES

September 23, 2003

The comments below are a summary prepared by Boisson and Associates (Ed Boisson, Jeff Lissack) of comments made at the August 11th focus group. The responses (in italics) were prepared by RTI International (Keith Weitz) and Hilton, Farnkopf, & Hobson (Susan Collins, Laith Ezzet), in consultation with staff from the California Integrated Waste Management Board (Fernando Berton, Steve Storelli).

STUDY SCOPE

About 16 comments involved a variety of fundamental issues related to the scope of the study. (Comments specific to technological configuration are summarized below under "Conversion Technology Configurations.")

What is being compared? Many comments suggested that fundamental changes be made to the scope to either modify or expand the area under discussion, and the implications for evaluating alternative state policies, including a) recommending that conversion technologies (CT's) would better be compared with other production facilities using the same feedstocks rather than with disposal facilities, b) recommending consideration of market impacts not only on recycling/composting but also on landfills and waste haulers as well as more broadly on waste prevention, and c) urging comparison with a wide range of alternative technologies used to manage organics, including composting, Alternative Daily Cover (ADC), waste-to-energy plants, bioreactors, and other in-vessel technologies.

Response: *Assembly Bill 2770 requires the CIWMB to compare conversion technologies with other solid waste management techniques such as composting, recycling, transformation, and landfilling. Comparison with other production or solid waste management facilities would be beyond the scope of the required legislation. The three particular conversion technologies (gasification, acid hydrolysis, catalytic cracking) were chosen because these were the technologies in which local jurisdictions have shown particular interest as evidenced by a "Request For Information" being issued by at least four jurisdictions. In addition, the three chosen technologies were ones seen as being at commercial status based on research conducted prior to issuance of the CIWMB's Request for Proposals. We agree that there may be additional viable CTs. The sister conversion technologies study being conducted by the University of California Davis and Riverside is evaluating a wider range of alternatives, including those mentioned.*

Cost-benefit analysis – A few comments suggested that the study should include cost-benefit analysis of CT's.

Response: *Assembly Bill 2770 requires the CIWMB to conduct a market impact assessment of CTs on the recycling and composting markets. A cost-benefit analysis would be beyond the resource commitment and scope of the required legislation.*

Market protection scenarios – A few comments expressed concern that the market protection scenarios reflect biases that could impact the study's credibility, and urged either their elimination or a clearer explanation of their purpose.

Response: *The purpose of the market protection scenarios is to facilitate policy discussions (via sensitivity analysis) and is not intended to reflect any bias towards or against one solid waste management method over another.*

Other-- Other scope-related comments included a) a recommendation to ask the legislature for an extension so that studies could be done in sequence rather than in parallel, b) questioning the wisdom of projecting future recycling diversion rates if the goal is to promote CT development, and c) commenting that the scope would be too narrow to allow for "holistic" approaches to market and life cycle integration.

Response: *a) CIWMB is currently investigating all available options so that the studies can benefit from each other. In the meantime, however, we will continue to complete the studies in parallel as necessitated by the deadlines in statute. b) The goal of projecting future recycling diversion rates is to develop realistic scenarios for evaluating future feedstock requirements including CTs. The goal is not to promote CT development or any other waste management technique. c) We agree that the scope of the study is designed to focus specifically on Live Cycle Analysis (LCA) and Markets Impact Assessment (MIA). Other holistic aspects mentioned, such as bans on crop residue burning, substituting composted manures for composted green waste, environmental justice, cross-media impacts of air and water quality regulations, will require additional research beyond this study. We will include these "unmodeled" but important aspects in the discussion of interpreting study results and study limitations.*

DEALING WITH DATA LIMITATIONS

About 27 comments addressed the issue of dealing with data limitations related to CT facilities. This subject garnered considerable attention at the focus group meeting and there was apparent consensus on the following subjects.

Need for specific data not generalized averages –Many comments strongly urged the use of specific data wherever possible. Three types of data were mentioned: a) Data based on actual commercial operations of CT's rather than business plan projections or pilot scale plants; b) Data

based on CA-specific facilities and infrastructure rather than national averages; and c) Data based on specific facility types or technologies rather than averages.

Response: *Our goal with respect to data collection is to collect the highest quality data possible. This means collecting data that is based on actual commercial operations, CA-specific infrastructure, and specific CT facility designs. We recognize that there may be deficiencies in the available data for CTs and we plan to carefully document data sources used and data quality.*

Need for careful documentation – Several comments expressed concern about the limited data available on CT's, and urged the study team to document sources, assumptions, and limitations of whatever data is used quite carefully.

Response: *We agree that there may be deficiencies in the available data for CTs and we plan to carefully document data sources used and data quality. Assumptions and limitations of the data and study results will be discussed in the context of presentation and interpretation of study results.*

Need for credible data – A few comments cautioned against relying too heavily on "industry experts" for predictions about recycling markets or data on CT facilities.

Response: *Our approach to developing estimates for future recycling growth and data for CT facilities is to draw from a wide range of stakeholders including industry, academic and government researchers, environmental groups, solid waste professionals, etc. In addition, historical data, where available, will be utilized.*

Need to emphasize sensitivity analysis in presenting findings – A few comments urged the study team to place greater emphasis on reporting study results in terms of sensitivity analyses rather than on trying to reach more definitive conclusions.

Response: *The goal of the LCA and MIA is not necessarily to reach definitive conclusions about CTs, but rather to better understand their potential role in municipal solid waste (MSW) management and the potential tradeoffs of environmental, health, and market impacts as compared to recycling, composting, and land disposal.*

Suggested Data Sources – A few comments suggested other studies or reports to refer to and/or offered to provide the contractors with information they have available about CT's.

Response: *We thank everyone for suggesting studies and offering to provide information. We will be following up on each suggestion and offer.*

ASSUMED CONVERSION TECHNOLOGY CONFIGURATIONS

This category received more comments than any other, with a total of 53 comments. The comments generally addressed one of the following five subjects.

Which technologies – Many comments noted there are many differing CT technologies and urged caution about characterizing or drawing conclusions about them as a group. Some urged that the study look only at CT technologies for which commercial scale operating data is available. Some wanted an explanation why the 3 particular CT technologies identified in the RFP were chosen for study and how the study would be used to evaluate other CT technologies. Some suggested distinguishing between the impacts of "life temperature" and "higher temperature" CT's.

Response: *The three particular conversion technologies (gasification, acid hydrolysis, catalytic cracking) were chosen because these were the technologies in which local jurisdictions have shown particular interest as evidenced by a "Request For Information" being issued by at least four jurisdictions. In addition, the three chosen technologies were ones seen as being at commercial status based on research conducted prior to issuance of the CIWMB's Request for Proposals. We agree that there may be additional viable CTs. The sister conversion technologies contract with UC is conducting a technology evaluation for the wider range of alternatives mentioned. These will include life and high-temperature technologies.*

Which feedstocks – Many comments focused on which materials should be counted as feedstocks for CT's to be included in the study: a) Some want the scope limited to post-Material Recovery Facility (MRF) residuals and mixed MSW, as originally defined. A few noted that the definition of "post-MRF" residuals varies with different collection and processing systems. A few said that the impacts of post-MRF residues and mixed MSW should be tracked separately in the analyses. b) Others either encouraged or discouraged including in the scope wood waste, food, post-industrial recyclables, materials reclaimed from landfill mining, or materials beyond the scope of CIWMB regulation. c) Some encouraged defining feedstocks by quality rather than source, and so allowing for inclusion of materials collected separately or subject to new sorting.

Response: *The target feedstock will be materials that are typically landfilled regardless of source (e.g. MRF, transfer station). The study being conducted by the University of California Riverside and Davis will identify the most amendable feedstocks for a particular conversion technology. This information will be used by RTI and its subcontractors for the subsequent lifecycle/market impact analyses.*

Location of facilities – Several comments questioned using the greater San Francisco and Los Angeles areas as the study region, and suggested modeling a smaller region, a more rural one and/or one with more agricultural wastes. Others questioned the assumption that CT's would be co-located with MRF's, saying that it was just as likely that they would be co-located with landfills or transfer stations.

Response: *CIWMB has reviewed the assumptions made regarding the location of the facilities and the potential value of including a smaller region and a rural region with more agriculture wastes. As a large percentage of California's municipal solid waste is generated and processed within the Los Angeles and San Francisco urban areas, staff believes both the environmental and economic impacts of conversion technologies should be assessed within these same areas. Continuing to focus the analysis on these two areas will best serve the interests of the Board and the Legislature. We agree that CTs can be co-located with transfer stations, MRFs, or landfills and we will consider this aspect as part of our study. (See section 3.2 of the Market Impact Assessment (MIA) technical memorandum.)*

Size of facilities – A few comments suggested the analysis would be more realistic if it modeled a larger number of smaller capacity CT facilities. One vendor recommended modeling larger capacity catalytic cracking facilities so as to access information from a broader range of facilities, and modeling steady growth in the cumulative capacity of such facilities.

Response: *The capacities of the CT facilities defined by the CIWMB in the RFP are consistent with the size currently being marketed/commissioned in the State. Therefore, we feel that these capacities represent realistic options for the near-future. Note also that the MIA modeling effort treats all of the facilities in each region as a whole, so that the important point is the total capacity being modeled, not the number of individual facilities.*

Timing of facilities – A few comments suggested moving the assumed start-up dates for CT facilities back a few years, since it's unlikely that the first CT's would be operating until then.

Response: *We feel that the start-up dates are representative of the near-future. For example, H-Smart Company is planning to break ground in CA soon with their SMUDA catalytic cracking technology for treating unrecovered plastics.*

LIFE CYCLE ASSSESSMENT METHODOLOGY

At least 36 comments related to the proposed life cycle assessment methodology, dealing with the following six subjects.

Emissions data – Many suggested the LCA should use different emissions data available for each specific technology rather than average data consistently available for all studied technologies, and that it should address all relevant emissions (e.g., dioxin and furans). A few suggested factoring in both current and proposed air emissions requirements (e.g., PM10).

Response: *Our approach to developing emissions data is to define specific conversion technology processes (gasification, acid hydrolysis, and catalytic cracking) that are being marketed to CA and collect data specific to those processes. We are working to identify all energy and material inputs and outputs for each process regardless*

of what data is available. Therefore, if we are unable to present quantitative values for specific inputs or outputs, we can address it at a more qualitative level. Current and proposed air emission regulations will be considered as part of the data collection process.

Embodied energy – Several comments suggested the LCA should take into account energy that would otherwise be used to make, reuse, or collect feedstock material. One asked if energy impacts depend on what type of electric load is displaced (base vs. peak) and another suggested tracking the use of potable or gray water in a manner similar to the balance and displacement accounting used for energy.

Response: *We typically account for the embodied energy of material inputs to a process as part of an LCA and it will be accounted for in the life-cycle inventory. The energy impact does depend on the type of electricity load being displaced and we have the ability to specify which load (base vs. peak) we use as the basis for calculating electricity offsets. Typically we use base load and we'll evaluate whether that makes the most sense in this case.*

We will track the consumption of water (potable vs. gray if possible) by the various conversion technologies.

System boundaries – Some comments suggested the LCA should account for emissions associated with transportation or use of feedstocks overseas or domestically. Some suggested the specific environmental impacts associated with recycling in export markets should be accounted for. One wants to be sure there is a clean line between impacts attributed to MRF's and CT's if they are co-located.

Response: *The LCA will capture any transportation of feedstock, whether domestic or overseas. Regarding impacts from co-located facilities, the manner in which our MSW Decision Support Tool (DST) is structured allows for clean lines to be drawn between waste management facilities. If a MRF and CT are co-located, they are modeled as separate and distinct facilities with the transportation distance between the facilities being close to zero.*

Impact indicators – Some comments questioned the meaning attached to "impact indicators" in the LCA, and one suggested using a specific indicator different than one included in section 4.2 of the LCA Technical Memo.

Response: *The impact indicators listed in the technical memorandum represent a starting point. As we get further along in terms of defining the technologies specifically and identifying potential environmental and/or health issues, we will refine the set of indicators.*

Health effects – One comment was concerned about the use of LCA to evaluate health effects given a lack of accepted protocols/standards for doing so. Others urged discussion of the

"precautionary principle" in interpreting potential health effects of chemicals for which little data may be available.

Response: *The ability of LCA to evaluate health effects is somewhat limited because LCAs are designed to represent average facilities and not facility X, in location Y, with release rate/concentration Z. Therefore, assessing health impacts in an LCA is limited to the conversion of inventory pollutants to toxic or cancer equivalents, or similar approaches. The approach we are taking to address potential health impacts is to identify all possible environmental and health impacts at a qualitative level, utilize existing health impact assessment methods such as the Environmental Defense Fund (EDF) Scorecard, and compile data (where available) that California's Office of Environmental Health Hazard Assessment (OEHHA) can use to investigate health risks associated with the CTs.*

Needed clarification – One comment asked for additional details on RTI's municipal solid waste decision support tool.

Response: *Additional information about RTI's MSW DST can be obtained from Keith Weitz, RTI, 919-541-6973 or kaw@rti.org.*

MARKET IMPACT ASSESSMENT METHODOLOGY

At least 37 comments related to the proposed methodology for the Market Impact Assessment.

Transportation and exports – Several comments suggested paying particular attention to projected changes in export markets (either international or domestic outside of California) for recyclables.

Response: *We agree that export markets, both existing and future, are critical factors in projecting trends in recycling markets.*

Positive impacts – Some suggested the market analysis should focus more attention on possible positive impacts of CT's on recycling, including expanding the range of materials collected, enhancing the economic viability of MRF's, and providing a hedge against the volatility of markets for recyclable materials.

Response: *We will include the positive impacts of CT on the recycling and composting industries.*

Source reduction – Some wondered whether and how the market analysis will account for trends in source reduction (e.g., food waste composting), zero waste, or producer responsibility.

Response: *We intend to use AB 939 time extension request applications to identify programs that jurisdictions plan to use to reach the 50% diversion requirement. Some of those applications may indicate that source reduction programs are planned for the future. In addition, historical source reduction data is already included in past and*

current recycling totals, and historical data will be used to predict future quantities.

Sorting – Some suggested paying particular attention to market impacts caused by different collection or sorting of materials motivated by desired CT feedstocks.

Response: *We will incorporate these concepts into the MIA study.*

Changing regulations – Some comments suggested that changing regulations be considered in the market analysis, especially those for: a) air quality regulations limiting growth of composting in LA region; b) changes in rules governing ADC; and c) removing agriculture exemptions and banning certain agricultural practices like rice burning.

Response: *While the rice-burning issue may not be included in this study, due to the two urban study regions, air quality regulations limiting the growth of composting is a significant factor for the future of composting in the Los Angeles area, as is the availability of landfills for ADC.*

Redemption system – A few comments wanted to be sure that AB2020 is taken into consideration in the market analysis—both the impact of deposit fees and the degree to which source separated collection for some plastic bottles already occurs pre-MRF.

Response: *We agree that these are important elements to be included in the study.*

Communities – A few comments suggested the study should account for impacts of CTs on host communities (e.g., tax revenue, jobs).

Response: *This issue has been added to the MIA, under institutional impacts. The markets impact study will assess the impact of job creation or elimination on the region under consideration, i.e., either Los Angeles, or the Bay Area.*

Energy subsidies – A few suggested the market analysis should take possible renewable energy subsidies for CT's into account.

Response: *The MIA model will include a single price point (tipping fee) for each technology. That tipping fee will be estimated by a separate research effort being conducted separately by the University of California at Riverside (UCR). The development of tipping fees by UCR will include many factors, renewable energy subsidies being among them.*

Other - Other comments on the market analysis included a) accounting for loss of ADC markets in LA County due to Puente Hills closure, b) a caution that reliance on 1066 plans may not capture future diversion for communities already at 50% recycling, and c) a recommendation to factor in avoided disposal costs if a material goes to a CT.

Response: *(a) The MIA will include projections related to the closure of the Puente Hills landfill and other landfills that are scheduled to close, and will examine impacts to both disposal and ADC markets. (b) Cities with diversion goals above 50% may or may not have program-specific plans to reach their diversion goals. Where program-specific information is available, it will be used to project future recovery levels. (c) The MIA will compare the costs of either disposal, recycling, composting, or CT.*

Needed clarification – One comment asked for a better explanation of the methodology for forecasting disposal costs and another asked for a better explanation of the methodology for estimating future recyclable material prices and accepted quality levels.

Response: *The revised technical memorandum includes a more complete description of cost and forecasting methodologies in Technical Memorandum For the Conversion Technologies: Market Impact Assessment. Additional information about this can be obtained from Susan Collins at HFH by calling her at 949-251-8628 or e-mailing her at scollins@hfh-consultants.com.*

FUTURE CIWMB POLICIES

Nine comments involved policy issues related to how the CIWMB should treat CT facilities in the future. Some policy comments involved views about definitions of the terms "incineration," "transformation," "conversion", "put or pay", and "highest and best use." A few comments suggested that CIWMB should adopt the Precautionary Principle and therefore only promote those technologies that are proven to be safe. Finally, a few comments involved concerns that promoting conversion technologies could potentially impair efforts to promote zero waste and extended producer responsibility policies.

Response: *Many of the comments received at the focus group meeting and subsequent written comments were not germane to the actual methodologies being proposed for the lifecycle and market impact analyses. The policy issues and definitions discussed at the focus group meeting and provided in writing will likely be addressed in the CIWMB's report to the Legislature. Draft findings will be submitted to the CIWMB for review and approval at a public meeting. This public meeting will be an opportunity for additional comments to be submitted.*

PEOPLE WHO ATTENDED FOCUS GROUP OR SUBMITTED COMMENTS

NAME	ORGANIZATION
Don Augestein	IEM Consulting
Robert Bateman	Roplast Industries
Fernando Berton	CIWMB
Ed Boisson	Boisson & Associates
Mike Centers	Allan Company
Susan Collins	HFH
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John Davis	California Resource Recovery Association
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Evan Hughes	Consultant
Steve Jones	CIWMB
Tim Judge	Masada Oxynol, LLC
George Larson	Plastic Energy, LLC
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Jeffrey Lissack	Boisson & Associates
George Lynch	Technikon
Kathy Lynch	California Resource Recovery Association
Dick Maclay	Advanced Energy Strategies
Bill Magavern	Sierra Club
Kay Martin	Ventura County Environ & Energy Resources Dept.
John McInnes	County of Santa Barbara Public Works Department
Heidi Melander	Northern California Recycling Association
Paul Relis	CR&R
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